

Sample: CDS130 Mid-term exam

- Be sure your exam booklet has 8 pages.
- Write your name at the top of each page.
- This is a closed book exam.
- You may not use a calculator.
- You may not use MATLAB during exam.
- Absolutely no interaction between students is allowed.
- Each question is worth 5 points. Partial credit may be awarded **ONLY** if work is shown.
- Duration for this exam: 75 minutes.

Q1. $(25)_{10} = (?)_2$

- A) 100110
- B) 10011
- C) 11001
- D) 110010

Answer: _

Q2. $(1101)_2 = (?)_{10}$

- A) 3
- B) 13
- C) 15
- D) 26

Answer: _

Q3. $(2011)_3 = (?)_{10}$

- A) 21
- B) 57
- C) 58
- D) 93

Answer: _

Q4. The binary system

- A) is a positional notation based on the powers of 2
- B) typically uses more digits than the decimal system to represent the same number
- C) all of the above
- D) None of the above

Answer: __

Q5 To avoid overflow problems, the maximum non-negative integer that can be represented with 5 bits is:

- A) 16
- B) 31
- C) 63
- D) 64

Answer: __

Q6 The minimum number of bits needed for an integer word to represent all integers between 0 and 1024 is:

- A) 8
- B) 9
- C) 10
- D) 11

Answer: __

Q7 How many zeroes are in the binary representation of 2^{20} ?

- A) 18
- B) 19
- C) 21
- D) 20

Answer: __

Q8. If an arbitrary 8 bit binary number is multiplied by 4, what is the maximum number of bits required to write that product as a binary number?

- A) 9
- B) 10
- C) 11
- C) 12
- D) 16

Answer: __

Q9. How many unique combinations of 1s and 0s are possible with 12 bits?

- A) 4096
- B) 4095
- C) 2048
- D) 2047
- E) None of the above

Answer: __

Q10. Which of the following is not a valid representation in the number systems specified:

- (A) 010010001_2 ,
- (B) 12345_6
- (C) 687_8
- (D) $FEDCBA_{16}$
- (E) None of the above

Answer: __

Q11. Convert 11110111_2 into hexadecimal.

- A) F7
- B) 157
- C) 3313
- D) B7
- E) None of the above

Answer: __

Q12. Here is a two's complement representation of an decimal integer: 0011 1001
Form the 8-bit negative equivalent of this binary integer use the two's complement method:

- A) 1100 0110
- B) 1011 1001
- C) 1100 1110
- D) 1100 0111
- E) None of the above

Answer: __

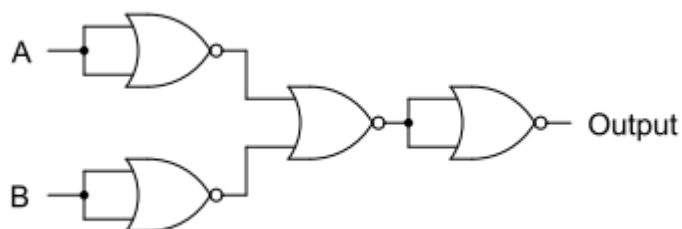
Q13. What is the 8-bit result of adding the following three 8-bit numbers together?

0 1 1 0 0 1 1 1
0 1 1 1 0 0 0 1
0 1 1 1 1 1 1 1

= _____

Assuming an unsigned representation, is there overflow? (circle one) yes no

Q14. What one logic gate is equivalent to the logic circuit shown below? Draw the logic gate.



Q15. Water flows into one, both, or none of the two white tubes at the top. What logic gate does it produce?



- A) AND
- B) OR
- C) NAND
- D) NOR
- E) XOR

Answer: __

Q16. What is the output of the following MATLAB code

```
clear;  
A(1,3) = 2;  
A(1,5) = 3;  
A(5)
```

- A) 3 3 3 3 3
- B) 2 2 2 3 3
- C) 0 0 2 0 3
- D) 0 0 0 0 3
- E) None of the above

Answer: __

Q17. What is the output of the following MATLAB code:

```
A = [1.2,3.4,5.6; 2.1,5.3,4.6];  
B = [1:3; 2:4];  
A+B
```

Answer: ans =

Q18. What is the output after executing the following MATLAB code:

```
clear;  
mat1(1,5) = 0.0;  
mat2(1,5) = 0.0;  
mat3(1,5) = 0.0;  
  
for i = [1:3]  
    mat1(i) = i*i;  
    mat2(i) = 1.0/i;  
    mat3(i) = mat1(i) + mat2(i);  
end  
mat3
```

Answer:

Q19. Use a single command to create a row vector (assign it to a variable named B) with 9 elements such that

```
B =  
  
1.1 1.2 1.3 1.4 1.5 1.4 1.3 1.2 1.1
```

Do not type the vector explicitly.

Answer:

Q20. Create a variable called result. Assign it a value of zero. Then create a FOR loop such that when completed, the variable result holds the value of the sum

$$1*2 + 2*3 + 3*4 + \dots + 1000*1001$$

Answer: